UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

DIPARTIMENTO INTERUNIVERSITARIO DI FISICA

General information		
Academic subject	Elementi di Metodi Matematici della Fisica	
Degree course	Fisica Triennale	
Academic Year	First	
European Credit Transfer and Accumulation System (ECTS)	6	
Language	Italian	
Academic calendar (starting and ending date)	First week of March – Last week of May	
Attendance	No compulsory attendance	

Professor/ Lecturer	
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Department and address	*Department of Physics, Via Orabona 4, Bari*
Virtual headquarters (Microsoft Teams code)	*j34o0tm*
Tutoring (time and day)	Thursday 11 am

Syllabus	
Learning Objectives	*Acquire knowledge of the theory of functions of complex variable, of the theory of distributions and of the Fourier transform; acquire the ability to solve problems related to these mathematical theories.*
Course prerequisites	*Knowledge from the courses of Analysis I, II and III*
Contents	Fuctions of a complex variable. Holomorphic functions. Cauchy Theorem , Residue Theorem, Cauchy Integral Formula. Multi-valued functions. Laurent expansion. Applications of residue theorem to evaluate definite integrals. Lebesgue integral. Distributions. Fourier transform and its property. Convolution. Applications: Helmholtz equation, diffusion equation, Schrödinger equation. Laplace transform.
Books and bibliography	Dispense (http://beta.fisica.uniba.it/cdlf/FisicaTriennale.aspx). Villani M.: El. di Metodi Matematici della Fisica I; Villani M.: El. di Metodi Matematici della Fisica II
Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
150	40	15	95
ECTS			
6			

Teaching strategy	
	Lectures on the board

Expected learning outcomes	
Knowledge and understanding on:	The course has a dual objective: on the one hand, the training one, in connection with the abstraction and generalization procedures typical of mathematics, also relevant for physics, on the other hand, to provide the mathematical tools necessary to deal quantitatively with the problems posed by the Classical and Modern Physics. The expected learning outcomes concern in particular a deeper understanding of the scientific method and the ability to apply appropriate mathematical tools to the analysis of the typical equations of Physics.

Applying knowledge and understanding on:	Ability to solve problems using the theoretical knowledge acquired and identifying suitable reasoning
Soft skills	• **Making judgments** Ability to evaluate the consistency of logical reasoning used in a proof Ability to identify the right mathematical tools and the right techniques to tackle complex mathematical problems • **Communication skills** Mastery of the mathematical language and formalism necessary to expose the acquired knowledge and to describe, analyze and solve problems • **Ability to learn independently** Ability to consult and understand texts related to the topics covered

Assessment and feedback	
Methods of assessment	The verification takes place through an oral exam. The oral exam begins with a proposed exercise, followed by the discussion of theoretical topics, examples, counterexamples.
Evaluation criteria	**Knowledge and understanding** The student must be able to present definitions and theoretical results including some demonstrations. **Applied knowledge and understanding** The student must be able to solve exercises and independently reconstruct simple theoretical topics. **Judgment autonomy** The student must identify the most suitable theoretical and practical tools for solving the proposed questions. **Communication skills** The student must present the theoretical results in a clear and complete way, using mathematical language and formalism with precision. **Ability to learn** The student must possess the specific vocabulary of the teaching and be able to identify the context of each concept.
Criteria for assessment and attribution of the final mark	Oral exam consisting in a discussion about the content of the course and opne exercise (100%)
Additional information	